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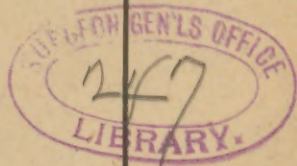
A CONTRIBUTION TO THE STUDY OF
CANCER OF THE RECTUM

BY

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IN the number for March 13, 1878, of his *Klinische Vorträge*, Volkmann published an article upon extirpation of the rectum for cancer, which was noticed in many journals and received much attention. The author claimed that the thorough removal of the cancerous tissue would effect a complete cure, or would at least be followed by a return of the disease only after the lapse of a long period, six or eight years in some cases, and also that the use of antiseptic precautions made this thorough removal a comparatively safe operation even when carried to the extent of opening the peritoneal cavity in the wound. His record of results bore out his statements, and his cases were so numerous that the reader might easily receive the impression that the author had operated upon most of the cases that presented themselves, and overlook the briefly stated opinion near the end of the paper, that it is comparatively seldom that an operation is justifiable.

In July, 1878, Prof. Van Buren published the notes of four cases in which he had advised removal by Volkmann's

method, in the *N. Y. Medical Record*, "as a contribution towards the better knowledge of the proceeding, simply as regards its feasibility and safety ; for its value as a remedy we must await results." Since this publication four additional operations in three new cases and in one of the old ones have come under my observation, which, with the subsequent history of the others and the microscopical examination of the specimens, throw some light upon the natural history of the disease and upon the facts which must determine the propriety of interfering actively, and the choice of an operation.

Removal of a cancer of the rectum is by no means a new operation, but, as heretofore practiced, it has proved a dangerous one, even when the tumor was small. The records of the operation show that the fatal issue is most frequently due to a diffuse, rapidly advancing septic inflammation of the para-rectal and retro-peritoneal connective tissue, extending sometimes in a few hours even to the diaphragm, and frequently associated with septic peritonitis. Volkmann sought to meet this danger, which seemed to have its origin in the retention and decomposition of the secretions, by thorough drainage through side channels established for the purpose, and by the use of not only the ordinary antiseptic measures but also that of antiseptic irrigation maintained for several days after the operation.

The success that has attended these measures proves it to be safe and possible, he claims, to remove the diseased parts much more thoroughly than has heretofore been attempted, and this thoroughness of removal has the great advantage of delaying the return of the disease and even in some cases of effecting a permanent cure. The extent to which he safely carried this removal is far in advance of anything that was done under the earlier methods, both in the length of the portion of the rectum and in the amount

of infiltrated connective tissue removed. The peritoneum even was opened in eight cases, all of which recovered.

The importance of any method that allows of the safe and thorough removal of cancerous portions of the rectum is relatively increased by the limited range and unsatisfactory character of the therapeutical alternatives, which, leaving a radical cure entirely aside, go no further than the establishment of an artificial anus in the hope of retarding the growth of the tumor and diminishing the pain, or may even be limited to keeping open a passage by scraping away the obstructing nodules and granulations or by the frequently repeated painful use of bougies. It has been amply shown that removal may, under certain circumstances, be followed by a permanent arrest of the disease, or at least by a period of freedom from any of its manifestations sufficiently prolonged to justify the interference. But it is equally certain that in other cases the progress of the disease has been rendered only more rapid by the interference, and that the relief from pain, the only advantage derived by the patient from the operation, might have been obtained more easily and effectually in some other manner. The important point therefore, the one to which our investigations should now be directed, is to learn to distinguish between tumors that are suitable for removal and those which are not. Operative surgery has provided for the proper treatment of both varieties; we can safely and effectually remove the former, and by opening the colon in the groin or in the loin we can meet the symptomatic indications of the latter; it remains to know when to attempt a cure, and when to stop at alleviation.

It is natural in seeking the answer to this question, to turn first to the anatomical structure of the tumors, and see if there are any histological differences which correspond with, even if they do not explain, the differences in prog-

nosis. It is only too often the case that this line of investigation leads to results that have but a limited practical bearing because of the difficulty of applying them to a given case at that period in its treatment when the application can alone be of use. Their greatest value is to be found in the means they afford of classifying clinical facts in such manner that more positive conclusions can be early drawn from them, and in bringing to light the natural history and tendency of the morbid growths. Clinicians and histologists have found in the rectum most of the varieties of tumors found elsewhere in the body, and there is no good reason for calling in question the accuracy of their examinations and descriptions, although it may be doubted if many of the varieties do not differ from one another rather in degree or mode of development than in their essential nature. With perhaps one exception, the morbid growths in the cases here considered belong in the class to which the name of cylindrical-celled epithelioma is given. The possible exception belongs to the variety known as colloid cancer, and although my examination was less thorough than I could have wished, I believe its origin to have been the same as that of the others. Some of the tumors showed individually at different points appearances which have been described as characteristic of radical differences in structure and nature; and, taken altogether, they present a complete series of gradations between what is described as polyp on the one hand and scirrhus or true carcinoma on the other. The enlarged and lengthened tubules of the mucous membrane, growing outwards into the lumen of the bowel, and showing no tendency to invade the underlying tissues, are found side by side with other similar tubules extending downwards into and through the muscular tunic, and reappearing in typical form in distant lymphatic glands. And in the deeper parts these tubes and their epithelial lining

undergo a series of changes in size, arrangement and shape (Figs. 2, 3, 4, 7, 11), which ends in the production of a tissue composed of small alveoli filled with irregularly globular epithelial cells and separated from each other by a fibrous stroma, a tissue having the appearance of true carcinoma.

There is no fundamental difference in the anatomical elements of these tumors to explain the difference in the results of the operations, but the tendency to local return seems to have depended entirely upon the extent to which the disease had involved the muscular coat of the intestine and the adjoining tissues. Only five of the eight cases here mentioned bear directly upon the question of return, for the remaining three died in consequence of the first operation upon them. The disease returned locally in three of these cases; the other two have remained free from it for periods of nine and thirteen months respectively. In all five cases the prominent anatomical characteristic of the tumors was the presence of tubules of irregular size and shape, lined with cylindrical epithelium. In the two successful cases the morbid tissue did not extend through the underlying thickened muscular coat of the intestine; even at the central, thickest part it was still distinctly limited by a layer of unstriped muscle. In the other three cases, on the contrary, the muscular coat was broken through, either largely or by a sort of perforation along the line of the blood-vessels; the adjoining connective tissue was condensed and hardened, and the lymphatic glands were enlarged and contained typical cylindrical epithelial formations. This implication of the para-rectal connective tissue and glands was noticeable not only in these three cases, but especially so in the cases in which the operation had a promptly fatal result. In these latter, and in one of the others (Case V), it was so extensive that a complete removal of the affected tissue was impossible, and it rendered

it difficult to bring down the upper end of the rectum sufficiently to attach it to the margin of the external incision without undue tension.

The three cases (Cases I, II, V) showed very plainly the part taken by the connective tissue, or the lymphatic glands, in the local return of the disease. In two of them (Cases I and II) the disease was found to have returned, on examination about seven months after the operation, in glands lying outside of and adherent to the rectum. In Case I the gland was removed through an incision made along the side of the coccyx and sacrum, and showed on examination tubules lined with cylindrical epithelium. A second return occurred in this case a few months afterwards. In Case V the stitches uniting the upper end of the rectum to the skin tore out and the gut retracted, leaving an annular raw surface from three to five centimetres in breadth to heal by granulation. A month after the operation, firm, hard nodules were found scattered over this surface, and these nodules which, although not examined microscopically, were undoubtedly cancerous, increased until their mass almost completely filled the excavation.

The mucous membrane limiting these tumors exhibits changes which clearly show their mode of lateral growth or extension (Fig. 10.) The tubes at an average distance of perhaps five millimetres from the edge of the tumor begin to lengthen and increase in diameter. Their epithelium shares to a variable degree in this hypertrophy, and sometimes the cells are distended by a clear, highly refracting, mucus-like substance. This enlargement increases steadily as the edge of the tumor is approached, and young embryonal cells are found in increasing numbers in the corresponding portion of the submucous layer of connective tissue. The thin layer of unstriated muscle lying between the tubes and the submucous connective tissue, the muscu-

laris mucosæ, persists apparently unchanged to the edge of the tumor; and at the point where it disappears the hypertrophied tubes take a sudden extension downwards into the thickened underlying layer of soft, young, embryonal cells, become irregular and branched, and their epithelium small and dark, with a tendency to become more globular and less cylindrical.

The normally scanty connective tissue between the tubes shares in the general hyperplasia, and merges with that of the submucous layer. When the surface ulcerates this tissue undertakes as usual the work of repair, and produces masses of granulations, in which the epithelial formations are found scattered at irregular intervals.

Under some unknown conditions the muscularis mucosæ persists, becomes thickened, and is reinforced by the development into fully formed connective tissue of the embryonal cells of the submucous layer. The overgrowth of the mucous membrane, and the retraction of the submucous layer, like that of a cicatrix, throw the former into a fold (Fig. 1), or, if only a restricted area is thus involved, into a polyp. This tendency to the formation of a projecting ridge or fold, is, of course, most marked at the border of the tumor, and is strengthened by inflammatory thickening of the para-rectal connective tissue, which, by preventing distention of the bowel, and maintaining its normal folds, favors the retention by the morbid growth of the normal form of the parts.

It is not uncommon also to find the morbid tissue extending laterally at some points on the margin along the submucous layer, under the unbroken muscularis mucosæ. Such points appear as firm rounded ridges covered with mucous membrane which to the touch and eye appears unaltered, except in being rather more coarsely velvety than is natural. The section of these ridges shows very plainly

a thickened mucosa resting upon an opaque white or yellowish mass, which itself lies upon, or is superficial to, the muscular tunic, and is continuous with the main body of the tumor, and identical with it in structure. This extension laterally along the submucous layer is in accordance with the well-known tendency of morbid epithelial growths to spread into softened proliferating connective tissue, or along what may be considered lines of least resistance.

The muscular coat of the intestine dips downward at the margin of the tumor, and extends under it in an unbroken line in the earlier or less developed stages of the affection. In the later stages its continuity is broken, and its identity as a layer lost, by union with the thickened para-rectal tissue and infiltration by the epithelial formations. It is always thickened by increase of its muscular and connective tissue elements. In some cases the muscular fibres are separated into small bundles by wavy bands of fibrillary tissue; in other cases the routes of the perforating vessels are marked by rapid and abundant proliferation of the cells of the accompanying connective tissue, a proliferation which prepares the way for the spread of the epithelial growths in the same direction.

The condition of the para-rectal connective tissue depends upon the depth to which the tumor has penetrated, and upon its extension laterally around the interior of the bowel. If the muscular tunic is unbroken, the thickening of the outer connective tissue is mainly confined to an area corresponding sensibly to the central or thickest part of the tumor, and it seems to be due entirely to a chronic inflammatory process set up and maintained by the adjoining morbid change, and not to specific infection or infiltration. If, on the other hand, the muscular coat is broken, the adjoining tissue furnishes a favorable nidus for the spread of the disease; it thickens rapidly in all directions, and the lym-

phatic glands imbedded in it enlarge, harden, and become the seat of secondary epithelial deposits (Fig. 7). It is not probable that this infection is delayed until after the muscular tunic has been plainly broken through; the process is more likely to be a gradual and contemporaneous one, the infection and the perforation taking place along the line of the vessels as above described; but it is certainly slow in the beginning, and takes its first rapid strides outside along the lines of the lymphatics only after the muscular barrier has been effectually broken down. The corresponding resistance to the spread of the affection offered by the thinner and weaker muscularis mucosæ has already been mentioned.

In examining the masses removed by operation, I have found enlarged and diseased glands at a distance of more than 5 cm. from the point at which the muscular coat had been perforated. In all such cases which survived the operation, the disease, as I have already stated, recurred locally, and there is no reason to think that removal sufficiently complete to effect a permanent cure is practicable when the disease has progressed to such an extent.

When the tumor involves a more or less annular segment of the bowel, and presents a notable obstacle to the passage of the feces, the thickening of the para-rectal tissues is increased by the mechanical violence inflicted upon the parts, and by the forcing downwards of the narrowed segment during the act of defecation. The use of bougies to enlarge the opening probably has the same effect, because dilation can be effected only by the rupture or stretching of the rigid fibres whose natural (cicatricial) retraction has been the cause of the narrowing. Each such act of violence excites a fresh proliferation, and thus hastens the progress of the disease.

The clinical history of this affection is not as complete as

could be desired, because an opportunity to observe its beginning is seldom given. In two of the cases here recorded (Cases III and VII), the patients came under observation at an early period. In each case the medical attendant detected a polyp which had given rise to some bleeding, and removed it more or less completely. A second examination in each case, after the lapse of about eighteen months, disclosed an unmistakable epithelioma. In Case I there was a history of "ulcerated hæmorrhoids," which had been frequently cauterized and snipped off. In all the others the tumor was found on the first examination, and the antecedent history was only that of more or less obscure rectal trouble and bloody stools.

The fully-developed tumors were found on digital examination to be hard lumpy or tuberculated masses, ulcerated at one or more points, sometimes with elevated well-defined borders, and sometimes shading off as a granular or coarsely velvety mucosa. Usually they surrounded the bowel entirely, or nearly so, and appeared in all cases to have begun upon its posterior surface. The tumor was, in some cases, continuous with the anus; in others, separated from it by a strip of mucous membrane of varying width. In every case the upper margin of the tumor was within reach of the finger. The ulcerated surface was elevated and covered with granulations, except in Case VIII, where it was deeply excavated. The ages of the patients were 30, 33, 36, 40, 42, 50, 50, and 64 years. In the youngest and the oldest, treatment was most successful. Four were males, four females.

The extent of para-rectal thickening is not easily estimated by the finger, and mobility of the tumor is not a trustworthy indication, because it may coexist with an amount of thickening and infiltration which renders complete removal impracticable. The duration of the affection

also throws no light upon this point, because the date of its beginning can seldom be determined. In the two cases in which the disease began as a polyp, the period between the recognition of the polyp and that of the fully-developed tumor was about eighteen months. It is evident, however, from the results of the microscopical examination given above, that the determination of the amount of thickening is vital to the question of treatment, because it is a measure of the extent of lymphatic infiltration or infection, and, of the probability of local return or generalization.

If the record of these cases is examined with reference to this point, it appears that the para-rectal tissue was extensively involved whenever the calibre of the rectum was so narrowed circularly as to offer a distinct obstacle to defecation. In the only case of this kind which survived the operation (Case V), the disease returned locally before the wound had healed. In another case (Case II), where there was circular implication of the bowel, but no noteworthy narrowing, a large hard lump, not adherent to the mucous membrane, was distinctly felt and included in the ligatures by which the affected zone was removed. The disease returned immediately in the cicatrix, and when a second removal was made by the knife, six weeks after the first, the connective tissue and some lymphatic glands were distinctly involved, as the microscope proved. In the two cases in which the disease has not recurred (Cases III and VII), it existed as one or more elevated patches with a granulating surface; the elevation of the patch in Case VII was such as to almost give it the appearance of a sessile growth.

These facts seem to establish two extremes: 1st, that narrowing of the bowel sufficient to be a distinct obstacle to the passage of the feces is accompanied by implication of the deeper tissues to an extent which renders prompt

local return of the disease certain ; and 2d, that when the disease exists as a circumscribed raised patch with an exuberantly granulating surface its removal may effect a radical cure. Between these two extremes there must exist a series of gradations, in the great majority of which, however, the disease will return ultimately, the differences lying in the activity of the recidive and the length of the period during which the patient will remain free from it. Return after free removal occurs first in the para-rectal connective tissue and involves the bowel only secondarily, in Case II only after the formation of abscesses which burst into the rectum.

If now upon these anatomical and clinical data we attempt to construct a theory of the character and development of the disease, we must regard it as one which, beginning as a simple local affection of the mucous membrane, progressively involves the underlying tissues, and ends in generalization through the lymphatic system. The fact that most of the tumors apparently began upon the posterior wall of the rectum about two inches above the anus makes a local constant cause probable, and points to some action upon the mucous membrane by the faeces, a mechanical action due to their arrest and pressure there, aided perhaps by some irritant change in their constitution.

It does not lie within the proposed scope of this paper to discuss the question whether cancer is primarily a local or a constitutional affection. The explanation of the local appearance of the disease and of its local return after removal, given by Sir James Paget, who is perhaps the most prominent upholder of the constitutional theory, is so far in accord with that offered by those who hold to the local theory as to render the discussion, in my judgment, mainly one of terms and definitions. If it is admitted that cancer of the rectum is essentially a glandular or epithelial affec-

tion, one having its origin in the mucous membrane, the borders of the growth, as being the freshest, most recent portions, must be examined, as in carcinoma of other organs, for evidences of primary changes and mode of development. These changes have been already described. They consist of hypertrophy of the mucosa by hypertrophy and hyperplasia of its epithelial elements, together with an abundant development of embryonal connective tissue between the tubules. They are the same as those found in a variety of neoplasm of recognized benign character known as polyp of the rectum or polypoid adenoma. The formation of a pedunculated growth with a tendency to isolation in the one case, and of a flat growth with a tendency to spread laterally and into the underlying tissues in the other, may be explained partly by mechanical causes and partly by the degree of intensity of the changes in the submucous connective tissue. If the primary change occupies a limited area upon a natural fold of the mucous membrane, and if the muscularis mucosæ remains unbroken until the young embryonal cells produced below it, in consequence of the neighboring irritation, have had time to develop into adult fibrous tissue, the natural retraction of this new tissue narrows the base of the fold, giving it at once a polypoid form and opposing by its greater density a stronger barrier to the extension of the epithelial formation in this direction. The pedicle once formed, the neoplasm increases in the directions open to it, that is, into the lumen of the canal in all its diameters, and the dragging to which it is subjected by the constantly recurring passage of the fæces lengthens its pedicle and tends towards its final separation.

On the other hand if a broader area is occupied by the primary change, or if the processes are more intense and rapid, the pedunculation is absent or less perfect, and the epithelial growths of the mucosa break through immediately,

or after an interval spent in overcoming the greater resistance offered by the partial pedunculation, into the submucous tissue. Once established in that region the spread of the disease is easy, and its ultimate generalization a question only of time.

The second and final barrier to generalization is presented by the muscular coat of the intestine, but it is a barrier in which are many gaps, large ones along the lines of the vessels, and innumerable small ones in the fine meshes of connective tissue which separate the muscular bundles and are continuous with the submucous tissue on one side and the para-rectal tissue on the other. Here, too, the intensity of the process materially affects the rapidity of its extension, for if the proliferating connective tissue, which is most easily implicated while it is in the formative stage, is allowed time to reach its full development, to become fibrous, it forms, as it were, a second line of defense capable of offering a certain resistance after the first line has been carried.

In the relative predominance of the production of connective tissue over that of the epithelial formations which are imbedded in it, lies the explanation of a fact observed in the two successful cases here recorded (Cases III and VII), and perhaps also of their less degree of malignancy. In both cases the ulcerated surface was covered with exuberant granulations containing very few tubules, and forming masses or lumps which in one case were broken off in considerable quantities during the operation. The predominance of granulation tissue in these detached pieces was so great that repeated examinations of some of them failed to show any tubules. The surface from which they came was very vascular, the vessels consisting of large, thin-walled, freely-inosculating, thickly placed capillaries. In a word, the surface was that of an ordinary granulating ulcer, and

the granulations had their origin in the stroma of the tumor. It seems reasonable to suppose that this tendency to more vigorous production of connective tissue, as compared with the epithelial elements, near the surface, existed also in the deeper parts, and aided in the manner above described to delay the cancerous implication of the para-rectal tissue.

I have used the terms *cancer* and *cancerous* in speaking of these tumors and different processes observed in them, because I believe them to belong to a connected series of morbid changes, the ultimate term of which presents characteristics, anatomical and clinical, the idea of which is generally accepted as attaching to those terms. Even if this belief should be erroneous, the error would not, I think, affect the following clinical deductions.

TREATMENT.—In estimating the advantages of treatment, the probable comfort of the patient and the period of his survival in case of non-interference, must be taken into account. The present cases afford no positive data upon the latter point, but the degree of cachexia, of functional disturbance, and of pain in all except Case II, was such that a prolongation of life for twelve months after they first came under observation was improbable. In another case, not included in this paper, which came under my care about three months ago, and was not considered suitable for operation, the patient, himself a physician, first noticed the symptoms of the disease in August, 1878, and he died in May, 1879.

Comparing this prognosis with the results of active interference, we find that in four cases death followed within ten days after, and as the result of, the operation. In one of these cases a chill, supposed at the time to be malarial, but which was possibly pyæmic, occurred the day before the operation. In two others the patients' general condi-

tion was very bad, and the disease very extensive. In the remaining case the patient had previously undergone two operations, the first twenty months, the second ten months before, and was much exhausted by pain and suppuration. Of the seven survivals after operation (representing five patients) two patients have remained entirely well and free from any return of the disease for thirteen and nine months respectively, and one patient died six months afterwards in consequence of prompt local return and rapid progress of the disease. One patient (Case II) underwent a second operation two months after the first, and on examination eight months afterwards the disease was found to have returned again; during the six months that have elapsed since that examination, it has progressed rapidly, and another attempt at removal is not considered justifiable. The remaining patient (Case I), improved greatly in health after his first operation. His second operation was performed a year after the first, and consisted in the removal of an affected lymphatic gland by an incision not involving the anus or rectum. His third operation was performed ten months after the second, and is included above among the fatal ones.

The *Lister method* was employed in five of the eleven operations; one of these (Case VI) died of peritonitis. Carbolic acid, without the spray, was used freely in three cases (I, IV and VIII); all died, one of pyæmia, one of exhaustion, and the third of exhaustion, after passing through an attack of peritonitis.

Removal of the entire cylinder, including the anus (the latter being a precaution recommended by Volkmann to diminish the chances of return), was done in five cases (I, III, IV, V and VI). One has remained well, one had local return of the disease, three died of the operation.

Removal of the entire cylinder, not including the anus, was

done three times in two cases (II and VIII), twice by the knife, once by ligature. In the latter case the disease returned immediately, before the wound had healed; one died of the operation, and in the other the disease returned in eight months.

Removal of only the affected portion, not including the entire circumference of the bowel, was done in two cases (I, VII). In one (removal by the *écraseur*) local return was detected in seven months; the other has remained well for nine months, as has been proved by several examinations.

These cases are too few and too varied in their treatment to allow of any very positive formulation of therapeutical principles upon them, nor is that the object of this paper, which is intended rather as a simple contribution to the study of the subject. Nevertheless, a few conclusions may be fairly drawn.

The first one is, that Volkmann's enthusiastic presentation of the advantages of extirpation of the rectum under antiseptic precautions is calculated to mislead surgeons, by inducing them to undertake it under circumstances which ought to clearly contra-indicate it. For, while the use of carbolic acid and drainage has notably lessened the dangers of the operation, it is far from guaranteeing patients, especially the feeble and cachectic, from death by shock, peritonitis, or exhaustion; and when the infiltration of the para-rectal tissues is extensive, one of two things will probably happen; either the patients will have become so reduced by functional disturbances, and the establishment of a constitutional infection, that they will be unable to meet the demands of the process of repair; or, secondly, the upper segment of the bowel will have become so adherent to the sacrum that it cannot be brought down to complete the operation properly by stitching it to the skin or lower segment, and the disease will return promptly in the wound.

When the disease involves the bowel circularly, and has been the cause of difficult and painful defecation for several months, and if the ulcerated surface is excavated, it may be considered certain that the connective tissue and glands are extensively involved. Under such circumstances, an attempt to remove the tumor radically must be unsuccessful, and if any operation is called for it should be a palliative one, such as the establishment of an artificial anus in the groin or loin.

On the other hand, tumors involving only a portion of the circumference of the bowel, with raised, well-defined borders, and a flat or lumpy, broadly-ulcerated, easily-bleeding surface, are slow to implicate the para-rectal tissue, and are, therefore, the most favorable cases for radical cure by removal.

Between these two extremes lie the cases in which, while it is probable the patient will recover from a well-conducted operation, it is certain that if he should do so, the disease will return in a few months in the tissues outside the rectum. The relief of the patient during this period is so complete, and the progress of the disease so far delayed, that it is justifiable to undertake the operation with the sole object of obtaining these two results. In the milder cases of this series, the operation holds out in addition the chance of an extirpation possibly so complete as to result in a radical cure; while in the severer cases the preferences of the patient, his mental condition, and his material surroundings must be taken into account in determining whether to attempt extirpation or to be content with colotomy.

Another deduction is, that not only is nothing to be gained by removing the anus when that is not involved, but also that it is not even necessary to remove a circular segment of the bowel when the tumor occupies only a portion of the circumference. A so-called "partial" removal can

be done as thoroughly as a "complete" removal, if division of the sphincter and bowel below the tumor is made the first step in the operation, and easy access to the underlying tissues thereby obtained. And yet it must be remembered that the disability produced by removal of the sphincter is not of much practical moment, and certainly not greater than that due to delayed and imperfect repair after its division.

And, finally, remembering the insidious growth of the disease, its amenability to treatment in its early stages, and its absolute lethality in the later ones, the physician should be always on the alert for the earliest indications of its presence, and should not allow himself to be soothed into fancied security by the community between its symptoms and those of other and much less serious affections. A polyp or polypoid growth discovered in the rectum of an adult should be looked upon as a possible, the latter even as a probable, starting-point of carcinoma, and it should be immediately removed, and removed thoroughly. It may be proper to remove with the *écraseur* a polyp that has a long thin pedicle, but when the growth is at all sessile and hard, the only safe course is to remove by a formal operation all the tunics of the bowel with it.

METHODS OF OPERATION.—1st. In the operation of total extirpation, the rectum having been thoroughly emptied, an incision is made around the anus at a distance of one or two centimetres from its margin, and then extended posteriorly in the median line towards the coccyx. By cutting with the knife or scissors, and tearing with the fingers, the surgeon makes his way upward outside the bowel, separating it entirely from the adjacent tissues to a point somewhat above the upper margin of the growth. If the rectum above this point is found so adherent that it cannot be easily brought down, its attachments must be still further

torn or cut until it is sufficiently liberated. All the lower portion, including the tumor, is then cut away, all thickened masses of connective tissue removed, and the edge of the bowel stitched fast to that of the skin. Drainage tubes are passed well up into the excavation on each side and behind, and brought out through the posterior incision, or through separate openings made in the skin for this purpose. It is well to place a rubber bag or ball in the rectum and inflate it so as to distend the rectum, and thus diminish the vacant space created around it by the dissection. Or, if the full Lister method is employed, a pouch of antiseptic gauze should be pressed up into the bowel and filled with plugs of the same material.

2d. When a strip of healthy mucous membrane lies between the tumor and the anus, and the latter is not to be removed, the sphincter should first be forcibly dilated, and then divided posteriorly in the median line towards or to the coccyx, and the incision prolonged up the bowel to the lower margin of the tumor. A corresponding incision may also be made anteriorly if absolutely required. The bowel is then divided transversely throughout its entire circumference below the tumor, and the operation proceeded with as in the former case, the end of the upper segment of the bowel being finally attached to that of the lower with silk sutures, and drainage entirely external to the rectum and anus provided for.

3d. When the tumor involves only a portion of the circumference of the bowel, and a complete ring or cylinder is not to be removed, the operation is begun as in the second case, and then, starting from the upper end of the incision, the involved portion of the bowel is separated from the underlying parts by tearing and cutting, and the incision is prolonged around the tumor at the distance of one centimetre from it until it has been entirely encircled and removed. If

the gap left is a small one, its sides may be sutured together longitudinally, but if it is a large one, the line of reunion should be crucial, the four corners at the crossing being held together by a stout silk ligature, embracing the entire thickness of the bowel. This ligature, like the others, may be left to cut itself out. Drainage must be as carefully provided for in this case as in the others, and in the same manner.

4th. Colotomy, as has been pointed out, may be employed as a palliative measure against pain, and also with advantage, I am inclined to believe, to retard the progress of the disease in case of its return in the tissues outside the bowel after extirpation. The operation in the left loin, lumbar colotomy, is now the method usually employed, but there are reasons why the other method, opening of the sigmoid flexure in the left groin, may be preferred. The latter method, which is generally known as Littré's operation, is free from some difficulties and chances of failure pertaining to the other, and the objection most strongly urged against it, that of having to open the peritoneum, has been shown by experience to be much less formidable than has been supposed. Its advantages are its ease of execution and the certainty with which the colon can be reached and opened. According to recent statistics, its mortality is not greater than that of lumbar colotomy. In lumbar colotomy the incision has to be carried through a much greater thickness of tissue, and the absence of landmarks is such that even surgeons of considerable experience in the operation have cut into the peritoneum accidentally, or have brought up and opened a loop of small intestine instead of the colon, and have discovered the mistake only at the autopsy.

CASES.*

CASE I, under the care of Dr. Keyes.

J. E.—, 50, a pale, thin, haggard man presented himself April, 1877, with complaint of constant leakage of pus from the anus, and great pain, especially after stool when there is also blood. He gave a history of "ulcerated hæmorrhoids" which had been frequently cauterized and snipped off. On examination a hard mass was felt about five centimetres above the anus, attached posteriorly, and involving from half to three quarters of the circumference of the rectum. The mass was slightly pedimentated and cauliflower-like; it projected into the cavity of the bowel and involved the tissues between it and the sacrum, without being adherent to the latter. It was most bulky in the centre where it was ulcerated, and tapered off on both sides.

1st operation, May 1. 1877.—The tumor was removed by first dividing it, the sphincter, and the skin back to the coccyx by means of the *écraseur*, and then removing each half of the affected tissues by encircling them successively with the wire of the same instrument. No antiseptics were used, the hemorrhage was slight. The growth was pronounced on microscopical examination to be a cylindrical-celled epithelioma. The patient made a good recovery and went home in about six weeks.

2d operation.—He returned six months afterwards considering himself cured, and reporting a gain of twenty pounds in weight. On examination a smooth hard lump as large as a walnut was felt just above the cicatrix, firmly adherent to the sacrum but entirely outside of and not involving the bowel. It was removed February, 1878, through an incision made along the right side of the sacrum and coccyx without cutting into the bowel. The patient recovered rather slowly.

3d operation.—He returned to the city, December, 1878, thin and haggard, with constant dribbling of blood and mucus from the anus, and complaint of pain in the rectum and back. A cauliflower-like growth occupied the cicatrix of the first operation and the bowel for some distance above it; the tissues between it and the sacrum were hard and infiltrated. Encouraged by his success in Cases II and III, Dr. Keyes determined to try complete extirpation of the anus and cylinder of the rectum to the height occu-

* Portions of the record of the first four cases were published by Dr. Van Buren, in the *N. Y. Medical Record*, July 13, 1878.

pied by the tumor, but he found himself unable to liberate and bring down the upper portion of the bowel or to remove all the infiltrated connective tissue, the upper limit of which was out of reach. He used carbolic acid freely to wash out the wound, but did not use the spray. The patient died of exhaustion within a week, no autopsy.

The nodule removed at the second operation was composed of irregular tabules lined with cylindrical and irregular epithelium imbedded in a connective tissue stroma.

The mass removed at the third operation shows an ulcerated surface about two centimetres in diameter, adjoining which on one side is a thickened fold one and a-half centimetres high and thick. The mucous membrane is velvety and injected. Vertical section through the fold shows a central stroma continuous with the muscular coat and lined by a manifold thickened mucous membrane shading off on the outer side to the slightly thickened mucous membrane of the adjoining surface, (Fig. 1). The surface of a vertical section through the ulcer is of an opaque, yellowish-white color, and of homogeneous appearance to the naked eye. Microscopical examination shows in the thickened mucosa of the fold irregular tubes lined with cylindrical epithelium; and under the ulcer the same tubes modified in size, shape, and character of the lining cells as described more fully in Cases II, III and V. The tubes show the same tendency here to become smaller and lose their central cavity, their epithelium becoming at the same time more globular and less cylindrical; and they are found side by side with groups of small alveoli occupied by irregularly globular epithelium, and separated from one another by a connective tissue stroma. (Fig. 2.) The strips of infiltrated para-rectal connective tissue show in places perfectly characteristic cylindrical-cell formations apparently not developed in lymphatic glands (Fig. 3.); and also some enlarged lymphatic glands presenting the same appearances.

CASE II, under the care of Drs. Van Buren and Keyes.

Mrs. L.—, a large, well-nourished lady about 40 years old, presented herself with a history of obscure pain or discomfort in the rectum which had been supposed to be due to malposition of the uterus. Examination of the rectum revealed a movable zone of lumpy thickening nearly surrounding the bowel at about five centimetres from the anus. This was removed March 10, 1878, by pinching it up in a transverse fold or tuck and transfixing the base of the fold with a continuous series of ligatures. The slough

came away in ten days and presented on examination the appearance of cylindrical-celled epithelioma, with a very abundant development of young connective tissue cells in a thick hard mass which underlay the zone at the posterior portion of the rectum. A month after the operation the wound was found cicatrized, except at one point on the posterior surface where a characteristic nodular growth showed the disease to be still active.

2d operation. On May 1, 1878, a zone of the bowel including this nodule and the cicatrix but not the sphincter was removed by operation according to the second method described above (page 20) with all the antiseptic precautions recommended by Volkmann. A mass of thickened connective tissue and fat occupying the concavity of the sacrum and extending four or five centimetres above the seat of the disease in the bowel was also removed. The patient made a good recovery, and on June 12th she visited Dr. Van Buren's office; he found, on examination, "that the wound was cicatrizing satisfactorily; about three-fourths of an inch within, the finger passed easily through a thread-like ring, marking the contracted end of the gut; beyond this, as far as the finger could reach, everything was soft and healthy."

On examination eight months after the operation a small nodule of stony hardness was felt about three centimetres above the anus in the tissues behind the bowel. Two months later three nodules were found, each as large as the end of the thumb, and together forming a mass which was firmly adherent to the sacrum within easy reach of the finger. The mucous membrane covering it was smooth, adherent, and apparently normal. The patient looked a little dragged and yellow, but made no complaint of local pain or discomfort.

At the present time, fourteen months since the last operation, the disease is still actively progressing, and the calibre of the bowel is so reduced as to admit only the index finger. The patient's condition is tolerably comfortable; there is no perceptible action of the sphincter, but its lack of power has proved no serious inconvenience.

The part removed at the first operation was too sloughy to admit of a thorough examination. The part removed at the second operation was a somewhat irregular band, averaging five centimetres in breadth, and occupying the entire periphery of the bowel, which, when opened out, measured about twelve centimetres. An oval portion of its surface, five centimetres in its longest diameter, is occupied by a granular, bloody, friable, cauliflower-like mass, and

surrounded by thickened, finely-papillary mucous membrane. The mucous membrane bordering the cicatrix of the first operation shows the same thickening and papillary condition on each side for distances varying from one to two centimetres. The ulcer and the greater part of the cicatrix rest upon and are continuous with a firm mass of connective tissue and fat from one to three centimetres thick and containing several enlarged lymphatic glands. A vertical section through the ulcer shows that it rests upon a gray, finely-alveolar mass of varying thickness, two centimetres at the most, without any distinct line of demarkation from the thickened adipose tissue except near its edge, where it rests upon a white fibrous band one and a-half centimetres long and irregularly continuous with the muscular coat. The adjoining fat is streaked with white bands and shows two distinct outlying nodules, one of them irregular in outline, the other apparently a degenerated lymphatic gland. Another lymphatic gland fifteen millimetres in diameter and distant more than three centimetres from the ulcer and cicatrix shows on section numerous grayish-yellow alveoli limited by fine white or bluish septa.

On microscopical examination the mass underlying the ulcer is found to be composed of round, tubular, and irregular spaces lined with cylindrical epithelium, and separated from one another by fibrous tissue containing round or oval nucleated granular cells in great numbers. The cylindrical cells rest directly upon the stroma. Instead of a single row of regular cells there is a double or triple row, and the cells nearest the centre of the spaces are irregular in form and often globular. The cells are granular and contain one or more dark nuclei with several bright nucleoli. The centre of many of the spaces is occupied by a mass composed of highly-refracting, small, irregular bodies and fatty epithelium. Many of the cells of the stroma show advanced fatty degeneration.

At the border of the ulcer the mucous membrane shows an abrupt change; the finely-papillary condition of its surface is due to an increase in the length and diameter of the Lieberkühn glands and a notable increase in the thickness of the submucous tissue. Immediately adjoining the edge of the ulcer the tubes suddenly become longer and irregular, and plunge down into the submucous tissue where they are no longer parallel to one another. The muscular coat recedes before the descending glands and disappears entirely below the deepest portion of the growth.

The lymphatic glands show in some places their normal struc-

ture and elements, in others a stroma and alveoli similar to those found in the primary growth (Figs. 6 and 7). The larger alveoli are lined with irregularly cylindrical, the smaller with globular epithelium. Many of the alveoli are irregular in outline, and their epithelium shows a tendency to infiltrate the adjoining tissue.

CASE III. Under the care of Drs. VanBuren and Keyes. Bridget K—, an unmarried woman of 30, presented herself with a history of a protrusion at stool, 18 months previously, accompanied by slight loss of blood and pain in the back. Her physician found the protrusion to be a polyp and removed it. During the next six or eight months she remained well; then the back-ache, discomfort in the rectum, and blood in the stools gradually reappeared, and she was sent a year later to Dr. VanBuren for advice. He found "several elevated patches with irregularly granulated surfaces, the largest towards the vagina, and nearly surrounding the rectum, at from an inch and a-half to two inches and a-half from the anus; the parts movable; no other evidence of disease; general condition good." The patient's mother was suffering at the time with, and died soon afterwards of, cancer of the rectum. The diagnosis of epithelioma was made and its removal advised.

Operation. May 20, 1878, Dr. Keyes removed the lower three inches of the rectum, including the anus, and stitched the edge of the gut to the skin, using antiseptic precautions and dressings, and keeping the lower end of the rectum distended during healing by means of an inflated, egg-shaped rubber bag traversed by a rubber tube open at both ends to provide for the escape of flatus. The bleeding was moderate, and recovery prompt.

The patient has remained perfectly well ever since, and apparently suffers no inconvenience from the loss of the sphincter. Dr. VanBuren says, "She has a natural sensation of desire, and a full painless evacuation follows; after this she goes around as usual, protected only by a simple compress and napkin."

The specimen examined after hardening in alcohol, shows an ulcerated finely-granular surface beginning just above the anus and measuring two and a-half cent. longitudinally by four laterally. This surface is bordered above and on the sides by a coarsely papillary, cauliflower-like, overgrown ridge, (Fig. 9), of irregular outline, reaching at its greatest breadth a point two cent. higher up the gut than the ulcer. There is none of the thickening of the para-rectal tissue which was so noticeable a feature in Case II.

Section through the ulcer shows that it is not more than five mm. thick (after hardening) ; the surface of this section is a uniform gray, without alveoli or mottling, and rests upon the muscular coat.

A section taken from near the surface shows irregular branching tubules lined with well-formed cylindrical epithelium, (Fig. 8). The tissue underlying the ulcerated surface is composed of young connective tissue in which are imbedded irregular tubes, mostly of small size, lined with double or triple rows of irregularly cylindrical and globular epithelial cells resting directly upon the stroma. The stroma is composed of fusiform, oval, and round cells with occasional large, fully developed fibres. Some of the culs-de-sac are lined with epithelium which is not in the least cylindrical, but is globular or irregular like much of that in Case II.

A section comprising the upper edge of the ulcer and the adjoining healthy mucosa, (Fig. 10), shows that the first change is the enlargement in length and diameter of the tubes ; embryonal elements soon appear between the tubes and in the underlying layer of connective tissue, and when the border of the ulcer is reached, this embryonal tissue is very abundant ; within it are contained tubes lined with cylindrical epithelium, of various sizes and running in various directions, while underneath the muscular coat is nearly doubled in thickness. At a short distance within the edge, the surface of the ulcer is composed almost exclusively of embryonal and half-formed connective tissue ; only a few tubes are found near the surface, but in the deeper layers they are crowded thickly together. The muscular coat is much thickened and broken up into bundles separated by vessels and new connective tissue. This dissociation is carried in places almost to the extent of separating individual fibres. (Fig. 12).

The muscularis mucosæ persists under the thickened mucosa beyond the edge of the ulcer until after a large quantity of embryonal cells have been formed underneath it in the submucous connective tissue, then it disappears, and the tubes extend suddenly down into this embryonal tissue and vary greatly in size ; the regularity of their epithelium is lost, and the cells are smaller, crowded thickly together, globular and opaque. (Fig. 11.)

Section through the papillary portions shows an unbroken, not much thickened muscular coat, upon which rests the greatly thickened mucosa thrown into folds and papillæ by its own increase. (Fig. 9.)

CASE IV.—“J. H—, 50, married; admitted to the N. Y. Hospital, May 18, 1878, under Dr. Geo. A. Peters. He is a pallid but well-nourished man, and has a warty, tubercular growth, extending about half an inch from the margin of the anus externally, and from one and a-half to two and a-half inches up into the bowel, and nearly surrounding it. There is an enlarged gland in the left groin. He gives a history of an operation for fistula sixteen years ago, and of a lump appearing afterwards, which same growth, as he believes, has only lately begun to give him trouble. The pain in defecation is now so severe as to require anodyne suppositories, and he demands an operation for its relief.

“On May 29th, the operation was done with all the antiseptic precautions except the use of the spray. The gut was readily brought down and amputated, well beyond the disease, and the edges of the stump sewed fast to those of the external circular wound. The bleeding was exceedingly moderate. Ample provision was made for drainage, and a tube placed in the rectum to give vent to gas. * * * The patient did well until 8 o'clock P. M. on the fourth day, when a severe chill occurred, with a rise of temperature to 103.2° , followed by sweating. On the fifth day there was complaint of pain in the right elbow-joint, and at 10 o'clock P. M., another severe chill and sweat. On the sixth day the temperature rose to 105° , and death took place at 4 o'clock P. M. (May 31st).”

It is to be noted that a chill occurred the day before the operation, supposed at the time to be malarial.

“Body examined at 12 o'clock M. next day. Rounded cicatrices on the the legs. Drainage tubes in position near incision around anus, which looks healthy; mucous membrane everywhere stitched to integument; no union has taken place. Rectum for an inch above wound dark-colored and somewhat softened; above this, healthy: no remains of disease; but little pus, and that not badly swelling. Right elbow-joint contained a small amount of pus. Liver fatty; no abscesses. Lungs slightly œdematous, no abscesses to be found. * * Kidneys shrunken and irregular on surface, with several cysts and many scars of old cysts; cortical portion markedly atrophied.

“Microscopical examination of the disease removed from the rectum shows colloid degeneration of a cylindrical epithelioma. Well-marked linear rows of micrococci were discovered between the muscular fibres in the heart; also in the kidney.”

CASE V. Personal: Michael D—, 42, unmarried, a large, pallid fat man, presented himself June 26, 1878, with complaint of painful, difficult, and bloody defecation. Eight months previously he had an attack of rectal trouble thought to be due to piles; had bloody and painful stools. Since then he has used laxatives and enemata regularly, but defecation has been always painful, and the stools frequently bloody. Bougies have been passed quite regularly by his physician.

On examination, the finger encounters a hard, lumpy fold extending all around the rectum two centimetres within the anus. The upper limit of the tumor can be reached easily on the anterior surface, but only with difficulty posteriorly. The surface of the growth is ulcerated and the finger comes out stained with blood.

Operation, July 11th. Total extirpation, including the anus, was done by the first method described above (page 19), with full antiseptic precautions. The para-rectal tissues were found extensively infiltrated and hard, and firm bands uniting the bowel to the sacrum rendered it difficult to bring the former down and unite it to the skin without undue tension. Hemorrhage was free at first, but no vessels required ligation.

The patient recovered easily from the operation, but on the sixth day the sutures were found to have all cut out, and the rectum to have retracted about two centimetres. Six weeks afterwards there was a gap of about four centimetres between the end of the rectum and the skin, scattered over which were numerous hard granular nodules, evidently a return of the disease. These nodules increased rapidly in size, ultimately forming a mass which filled the *faeces* leaving only a narrow central channel through which the *face* passed. The patient sank gradually and died Jan. 9, 1879. No autopsy allowed.

On examination of the part removed, when fresh and spread out after division longitudinally a little to the left of the anterior median line, along a narrow groove where the mucous membrane seemed not to be involved, it was found to measure eight centimetres longitudinally and ten centimetres transversely. Along the transverse line of little pouches just within the anus the mucous membrane is raised in a ridge or fold about five millimetres high. This ridge is smooth, not ulcerated, and encircles the growth except on one side of the groove above mentioned. The surface of the tumor is ulcerated, flat, granular, and friable.

After hardening in alcohol and dividing it along the posterior

median line, the tumor is found to be two centimetres thick in the centre, and composed of a white or bluish stroma enclosing small granular alveoli. There is no trace of mucosa on the surface, or of muscle on the outside ; at the upper border is a ridge lined with thickened mucosa ; at the lower border the unaltered anus. In some places the ridge is rounded and shows the same structure as the body of the tumor ; at others it is simply a fold of much thickened mucous membrane with a central (vertical) line of connective tissue. It is evident that at the thickest part of the tumor the line followed in the extirpation was not entirely outside of it.

On microscopical examination it is found to be composed of connective tissue and epithelial elements. The latter are sometimes cylindrical and arranged in distinctly limited alveoli, but in the majority of cases the epithelium is irregular or globular, and collected in irregular masses with a marked tendency to infiltrate the adjoining tissue. (Fig. 4).

CASE VI.—Dr. Keyes. Mrs. G——, 33, was admitted by Dr. Keyes to Bellevue Hospital in July, 1878. She sought treatment on account of difficulty in defecation which had existed for about two years, with frequent desire ; the stools being always painful and bloody.

On examination a hard, lobular mass was found just within the anus, entirely encircling the bowel and narrowing its calibre to such an extent that the finger could be passed only with difficulty through it. The mass was thickest in front and on the left side, and was not adherent to the vaginal mucous membrane. There was a fistula near the anus communicating with the gut.

Operation. Total extirpation was performed antiseptically in August. During the operation an abscess of some size was found in the para-rectal tissues which were much thickened and hardened.

Peritonitis developed, and the patient died on the third day. At the autopsy the rectum for five centimetres above the point at which it had been divided was found thickened and narrowed ; the kidneys were large and fatty ; the peritoneum had not been wounded.

The tumor proved on examination to be a cylindrical-celled epithelioma.

CASE VII. Personal. Dr. P. Le B. S——, 64, married, was admitted to the Presbyterian Hospital under my care in September, 1878, with the following history : In October, 1876, he lost

some blood at stool and felt with his finger a lump inside the anus. This was pronounced to be a polyp, and partial removal was made with an *écraseur* shortly afterwards. He continued to lose blood in small quantities, and the following May (1877) another partial removal was made. His condition gradually grew worse for a year and he came to New York in May, 1878, to consult Dr. Van Buren, who found a hard irregular mass on the posterior wall of the rectum, apparently an epithelioma, and advised its removal. In September, 1878, the patient returned to New York for operation and was placed under my care by Dr. Van Buren.

He is a large, fairly-nourished man, who has always had good health, but is now anæmic, weak, and dragged-looking; has never been in the habit of using enemata, although habitually constipated; has never suffered from piles until quite recently; has no family history of cancer.

On examination I find a lobulated mass occupying the posterior wall of the rectum, beginning nearly four centimetres above the anus; it is circular, about four finger-breadths in width, and its upper edge, although quite high, can be reached with the finger. It is circular, its edge raised and well-defined; it bleeds easily when touched, and is movable on the underlying parts.

Operation, September 16, 1878. The affected portion of the bowel was removed with all antiseptic precautions by the third method described above (page 20), the line of incision lying one centimetre beyond the border of the tumor. The patient recovered easily from the operation and returned home on October 12th, with longitudinal incision through the sphincter not entirely healed. February 19, 1878, he wrote me that a thorough examination had just been made with the aid of a speculum, and that the rectum had been pronounced perfectly healthy. There was slight prolapse and occasional incontinence of flatus. His general health was better than it had been in two years. I have heard from him again recently, and he continues well.

The tumor, which was so friable that a number of pieces, some of them as large as the end of the finger, were broken off during the operation, is nearly circular, measuring six centimetres transversely, five centimetres longitudinally. Its surface, rising well above the level of the adjoining mucosa, is irregular and granular, pink and gray in the centre, dark-red at the border. Its junction with the mucosa looks worm-eaten in places, that is, the edge of the latter is free, ulcerated, and marked by a row of small livid elevations.

A vertical section through the tumor shows a very vascular upper edge continues with the mucosa, and resting on a white, juicy, thick base. The surface of section yields an abundant milky juice which shows under the microscope deformed and degenerated epithelial cells, some of them purely cylindrical, and shreds composed exclusively of them. A fresh section from the surface shows it to be very vascular granulation tissue containing portions of a few tubules lined with cylindrical epithelium. The mucosa adjoining the tumor is thickened by increase in the size of the tubes and then when the muscularis mucosæ is broken through the tubes extend abruptly downward into the softened and thickened submucous tissue. The other histological appearances are identical with those described in Case III, (Fig. 10 and 11), and therefore do not need a separate description here. The muscular coat of the intestine is not broken through.

CASE VIII. Under the care of Dr. Chas. K. Briddon. Susan S——, 36, thin and feeble, admitted to the Presbyterian Hospital September 14, 1878. Six months ago she began to suffer with severe pain in the back, and had bloody stools; this condition lasted for two months and was followed by two months of relief; then, two months ago, the symptoms recurred in aggravated form and have persisted; she has intense rectal tenesmus, constipation, and bloody stools. An aunt died of tumor of uterus of unknown character.

On examination the finger encounters at about six centimetres from the anus an irregular nodular growth, involving principally the posterior surface and right lateral half of the bowel, and continuous on the right side with a solid mass as large as a hen's egg, and fixed to the pelvic wall. The upper border of the growth can be reached by the finger with difficulty.

Operation, September 21, 1878. A circular zone, not including the anus, was removed according to the second method described above (page 19). It was found necessary to open the peritoneum, after its recognition, in Douglass's cul-de-sac to the extent of about five centimetres; this opening was afterwards closed with catgut sutures.

The patient died on the tenth day, after having passed through an attack of peritonitis which was controlled by morphine and cold applications to the abdomen. She was unable to retain food, and died of exhaustion. At the autopsy the sutures were found to have all cut out, and the pelvic retroperitoneal space was infiltrated with pus.

The affected portion of the rectum was seven centimetres in length, and presented a deep, funnel-shaped ulcer with irregular, raised edges, and some thickening of the adjoining mucous membrane; the ulcer was six centimetres in diameter, and four centimetres in depth. The lumen of the rectum was contracted to a diameter of fifteen millimetres. The histological appearances were similar to those in Case V.

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